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Occultations of Stars by the

Observed at the Davidson Observatory, San Francisco, California,

(*Communicated by*

No.	Date 1883.		Star.	Estimated Mag.	Phase.	Obs.	Telescope.		Chronom.
							Ap. inch.	Power diam.	
1	Jan.	14	Yarnall 413	7½–8	Im.	C.B.H.	6·4	90?	Sid. 223
2			Anon.	8½–9	,,	,,	6·4	90	,,
3			Arg. + 7° : 119 (?)	7½–8	,,	,,	6·4	90	,,
4			Anon.	8–8½	,,	,,	6·4	90	,,
5		15	Arg. + 11° : 218 (?)	8	,,	,,	6·4	90	,,
6			Arg. + 11° : 217 (?)	8½	,,	,,	6·4	90	,,
7	Apr.	16	14 Sextantis	—	,,	,,	6·4	120	,,
8	May	10	λ Geminorum	—	,,	,,	6·4	90	,,
9	June	12	Anon.	8½	,,	,,	6·4	150	Sid. 3479
10			B.A.C. 4020	7½	,,	,,	6·4	150	,,
11	Sept.	11	ϕ^1 Sagittarii	—	,,	G.F.D.	6·4	40	,,
12			ϕ^1 Sagittarii	—	,,	C.B.H.	3·0	105	Sid. 223
13		12	(R.A. $20^h\ 10^m\ \delta - 15°\cdot6$)	8½	,,	,,	6·4	90	Sid. 3479
14			β^1 Capricorni	—	,,	G.D.	6·4	120	,,
15			β^2 Capricorni	—	,,	,,	6·4	120	,,
16			β^2 Capricorni	—	,,	C.B.H.	3·0	40	Sid. 223
17	Nov.	4	(R.A. $18^h\ 35^m\ \delta - 18°\cdot7$)	9½–10	,,	,,	6·4	—	M.T. 5038

(*a*) Hazy, blurred, and tremulous, but disappearance sharp. Felt a slight doubt as to whether ∗ disappeared *just* previous to 59·5 beat or 60·0 beat.

On a New Solar Eyepiece. By Adam Hilger.

Several forms of eyepieces have been contrived for the purpose of diminishing the light and heat from the Sun in a degree sufficiently great to permit of the using of large apertures without inconvenience to the observer.

One of the best known prisms is that which was devised by Sir John Herschel, in which a prism is used whose first surface is placed at an angle of 45°; only about one-twentieth part of its light is reflected on to the eye, the other nineteen-twentieths passing out of the telescope.

In 1871 Professor Pickering (*Proceedings American Academy of Arts and Sciences*, Feb. 14, 1871) devised an ingenious modification of this plan by cementing a second prism on to the first prism by a substance whose index of reflection is very nearly equal to that of the glass. In consequence an exceedingly small

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Moon, 1883. By George Davidson.

during the year 1883. Lat. 37° 47′ 24″·1 N., and Long. 122° 25′ 37″·6 W.

the Secretaries.)

Chron. Time as recorded.	Correction to Chron.	Observations.		Remarks.
		Local Mean Time.	Local Sid. Time.	
h m s	m s	h m s	h m s	
3 23 40·8	−3 53·55	7 42 44·5	3 19 47·2	Good. ✱ about 5′ S. of centre
4 6 38·5	−3 53·62	8 25 35·2	4 2 44·9	Pretty good. ✱ nearly at centre.
4 15 28·3	−3 53·63	8 34 23·5	4 11 34·7	Good. ✱ about 8′ S.
4 17 21·4	−3 53·64	8 36 16·3	4 13 27·8	Good. ✱ about 11′ N. of centre
1 55 3·5	−3 55·90	6 10 23·5	1 51 7·6	✱ about 10′ S. of centre.
1 58 46·9	−3 55·90	6 14 6·3	1 54 51·0	✱ about at centre.
11 37 3·4	−1 22·67	9 55 33·3	11 35 40·7	Very good.
12 30 59·45	−0 24·99	9 15 56·3	12 30 34·5	(*a*)
14 10 25·7	−0 15·40	8 45 30·8	14 10 10·3	Nearly at centre.
14 25 10·0	−0 15·40	9 0 12·6	14 24 54·6	About 5′ N. of centre.
21 27 48·8	+0 3·40	10 4 13·2	21 27 52·2	G.D. marked time. Recorded $48^{s}\cdot 9 - 0^{s}\cdot 1$.
21 28 38·2	−0 46·85	10 4 12·4	21 27 51·4	? $38^{s}\cdot 7$ (*b*)
21 41 16·0	+0 4·63	10 13 43·5	21 41 20·6	✱ *just* S. of centre.
0 6 17·2	+0 4·75	12 38 21·1	0 6 22·0	
0 [14] 50·1	+0 4·76	12 45 52·8	0 13 54·9	Minutes assumed 13.
0 14 43·3	−0 48·46	12 45 52·8	0 13 54·8	
6 52 38·8	+5 58·18	6 58 37·0	21 54 39·3	✱ very faint, obsn. doubtful. Not in Wash. zones.

(*b*) I heard G.F.D.'s call, and disappearance to my eye happened 0^{s} 2 to $0^{s}\cdot 3$ before the sound reached me, or at $48^{s}\cdot 5$ on his chronometer. Carried beats 6 or 7 minutes, and mine may have been one beat in error.—C.B.H.

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fraction of the total light is reflected, nearly all the light and heat passing out of the telescope.

It is obvious, however, that in this arrangement there is the drawback of the existence of two reflections, one at the surface of the cementing layer, and a second reflection at the surface of the second prism.

Professor Pickering relied upon the extreme thinness of the layer of Canada balsam, which was the cement used, for the sensible superposition, and merging into one of the two reflections, so that the definition should not be impaired by any noticeable duplication of the image.

I have constructed several of these eyepieces, but I have not been able to make the cementing layer so thin, but that with high powers the definition begins to break down, being sensibly impaired by the double reflection. In the new form of eye-

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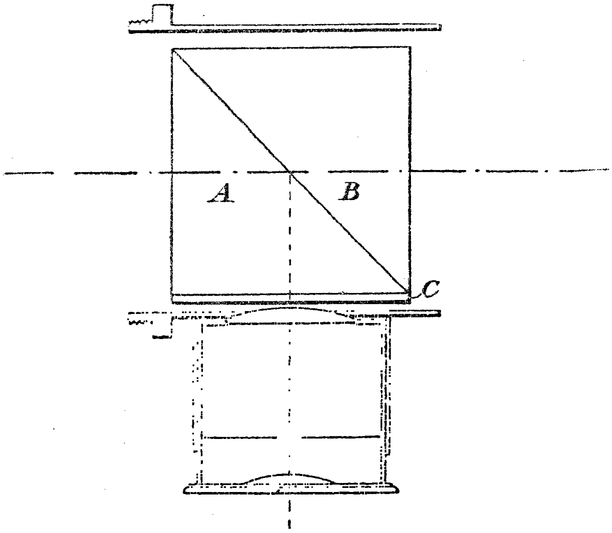
piece which I have now the honour to submit to the Society I have succeeded in doing away with the second reflection, and at once restoring the quality of the definition to that which the telescope is capable of giving, and also at the same time reducing to nearly one-half the amount of light reflected to the eye. I have accomplished this improvement by making the second prism B of solid Canada balsam contained in a glass cell, of which the surface of the first prism forms one side. There is consequently one reflection only, where the first prism A meets the solid Canada balsam at the angle of 45°.



The first prism is made of glass, whose index of refraction is very near that of the solid balsam.

The amount of light reflected is so small that large apertures may be used without any further protection to the eye.

To reduce still more the amount of light, especially if very large apertures were used, I cemented a thin plate of neutral tint glass C on the surface of the prism A, where the light emerges after reflection. An eyepiece of pale neutral tint glass I found also to produce the same effect as the thin parallel neutral tint plate.

I consider the eyepiece will be found most generally useful in the form which it is described in this paper, with a pale neutral tint plate permanently cemented to the face of the prism.

The two principal advantages which I venture to claim for this new eyepiece are:—

1st. No impairment of definition when high powers are used.

2nd. A further diminution of the small fraction of light reflected by Professor Pickering's eyepiece to nearly one-half.

Erratum.

Vol. XLIV., page 452, line 11 from below, *for* $20^{s}\cdot25$, *read* $12^{s}\cdot25$.